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**I, SALLY LESLEY HEDLEY, B.A., M.I.L., M.I.T.I., declare**

1. That I am a citizen of the United Kingdom of Great Britain and Northern Ireland, residing at 29 Parkholme Road, London E8 3AG.
2. That I am well acquainted with the German and English languages.
3. That the attached is a true translation into the English language of the Specification of International Patent Application No. PCT/EP2005/002241.
4. That all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardise the validity of the patent application in the United States of America or any patent issuing thereon.

DECLARED THIS 31<sup>st</sup> DAY OF JULY 2006



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**Conveyor device having a filling device for vertical flow of material, without demixing, of powdered media**

5 The invention relates to a conveyor device having a filling device for vertical flow of material, without demixing, of powdered media having different particle sizes and different particle densities.

10 Such conveyor devices having filling devices are used in tabletting processes for transferring the press mass to be tabletted from a supply container, which is located above a tablet press, vertically into a feed shoe of the tablet press. For that purpose, conventional conveyor devices have vertical tube or hose systems which are arranged below the  
15 supply container. In such conveyor systems, when the supply container is opened there is a risk that the material to be tabletted will initially drop in free fall as far as the feed shoe until the tube or the hose is completely full, which has the disadvantage, especially in the case of press  
20 masses comprising components having different particle sizes and different particle densities, that demixing can occur. Accordingly, in the subsequent tabletting process, inhomogeneities arise in the tablets produced. This impairs the quality and the composition of the tablets and has  
25 serious consequences in respect of medication for the final user.

30 The aim of the invention is further to improve the teaching of DE 103 24 715 and to provide a conveyor device having a filling device that is suitable for achieving vertical flow of material, without demixing, of powdered media having different particle sizes and different particle densities.

That aim is achieved by the subject of the independent claims. Advantageous developments of the invention will be found in the dependent claims.

5 The invention provides a device having a filling device for vertical flow of material, without demixing, of powdered media having different particle sizes and different particle densities, the conveyor device having a supply container which is arranged vertically above a tablet press.

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The supply container has a lower opening to which the filling device can be coupled. The filling device has in turn an inlet hopper having an upper inlet opening which can be coupled to the lower opening of the supply container.

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Furthermore, the inlet hopper has a lower outlet opening, which is formed by a guide tube and has a smaller diameter than the upper inlet opening. On the guide tube there are arranged telescopic elements and an outlet hopper which has an outlet flap.

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The supply container can be constructed so as to be closable. For that purpose, a flap can be provided by means of which the lower container opening can be closed. The flap can be constructed so as to be pivotable about an axis.

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When the telescopic elements are in a contracted position, the outlet flap of the outlet hopper is closed and can be opened only when the telescopic elements have been extended and a mouthpiece, which surrounds the lower region of the outlet hopper, has been connected to the feed shoe arranged underneath.

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In a preferred embodiment of the invention, the internal diameters and the external diameters of the telescopic elements are so matched to one another that they have a sliding fit. This has the advantage that the contracted  
5 telescopic elements can be extended from a contracted position to an extended position without problems.

In a possible embodiment, sealing elements, such as sealing rings, can be dispensed with.

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It is also possible for the telescopic elements, which can have a sliding fit, and the outlet hopper each to have on their inner surfaces at least one sealing ring in the region of their upper edges. Such a sealing ring in the region of  
15 the upper edges of telescopic elements and outlet hopper can be arranged in an annular recess in the respective inner wall. That has the advantage that when the telescopic elements are extended to form an elongated telescopic tube, the telescopic tube remains sealed to the environment and  
20 material cannot escape from the telescopic tube in the extended position.

In a further embodiment of the invention, it is possible for the guide tube of the inlet hopper and the telescopic  
25 elements, which can have a sliding fit, each to have at least one sealing ring in the region of their lower edges. Such sealing rings can be arranged in corresponding annular recesses in the respective outer walls. That has the advantage that material from the flow of material cannot  
30 become deposited in the gaps of the sliding fit. Furthermore, the ability of the telescopic elements to be displaced relative to one another and the ability of the telescopic elements to be displaced with respect to the

outer wall of the inlet hopper and the inner wall of the outlet hopper is not impeded by deposits.

For that purpose, the sealing rings can have sealing lips  
5 which are in sealing, sliding contact with the inner walls and outer walls.

It is also possible for sealing elements, for example in the form of sealing rings or sealing lips, to be provided both  
10 in the region of the lower edges and in the region of the upper edges, so that each fit gap between the slidable telescopic elements, which can have a sliding fit, as well as between the outer wall of the guide tube of the inlet hopper and the inner wall of the outlet hopper is doubly sealed.

15 The mouthpiece in the lower region of the outlet hopper is so configured that it can be docked to a feed shoe of a tablet press. For that purpose, the mouthpiece has a rubber-elastic tubular casing which, by virtue of its external  
20 diameter, allows a sealed fit to an opening of the feed shoe of a tablet press.

In order to keep the outlet hopper closed while the telescopic elements are in the contracted position, the  
25 outlet flap, which is arranged in the outlet hopper and is able to close the outlet opening of the outlet hopper, has a pivot axis about which the outlet flap is pivotable in the interior of the outlet hopper. On the outlet flap there is arranged an operating element arranged outside the outlet  
30 hopper. Such an operating element can be constructed so that the outlet flap automatically remains closed when the telescopic elements reach the contracted position. In addition, the operating element can be so constructed that

it unlocks the outlet flap and unblocks the opening only when the mouthpiece has been securely arranged in an opening of the feed shoe.

5 Furthermore, the outlet hopper has a handle which is arranged on the outer surface of the outlet hopper. By means of the handle it is advantageously possible to pull the telescopic elements out of one another and to push them one inside the other as well as to dock the mouthpiece to the  
10 feed shoe after an extending operation.

The handle can co-operate with an automatic introduction or operating device and/or can be operated by an operator.

15 In summary, the particular advantage of the telescopic filling device is that press masses comprising components of different particle sizes and different particle densities are conveyed from the supply container into the feed shoe without demixing. When the supply container is opened, the  
20 telescopic tube comprising telescopic elements is initially in the fully contracted position. After the supply container has been opened, the telescopic tube, with the outlet flap closed, is slowly guided downwards by means of the handle, so that free-fall of the powdered medium with the  
25 composition of the subsequent press mass and demixing of the powdered medium is prevented. The outlet flap of the filling device in the lower region of the outlet hopper is then opened only after docking to the feed shoe of a tableting machine.

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The invention will now be described in greater detail with reference to the accompanying Figures:

Figure 1 shows a conveyor device having a filling device in accordance with an embodiment of the invention, after the filling device has been docked to a supply container;

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Figure 2 shows a conveyor device having a filling device according to Figure 1, after the filling device has been docked to a feed shoe.

10 **Figure 1** shows a conveyor device 6 having a filling device 7 in accordance with an embodiment of the invention, after the filling device 7 has been docked to a supply container 8. The supply container 8 has a lower opening 9 to which an inlet hopper 1 is coupled by its upper opening 10. The lower  
15 opening 9 of the supply container 8 is closable by means of a flap 26, the flap 26, the outline of which is shown by a dotted line, being pivoted about the axis 27. In the position shown here by the dotted line, the flap 26 is in an open position.

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The inlet hopper 1 serves at the same time for receiving a telescopic tube 2 which is shown in the contracted position in **Figure 1**. In this embodiment the telescopic tube 2 consists of four telescopic elements 13 which, by virtue of  
25 their graduated diameters, are pushed one inside the other by sliding. The innermost telescopic element 13 is arranged to slide on the outer wall of a guide tube 12, which is rigidly connected to the inlet hopper 1, and carries the contracted telescopic tube 2 on its outer wall.

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The guide tube 12 has an outlet opening 11 which is smaller than the inlet opening 10 at the upper side of the inlet hopper 1. The inner contour 25 of the inlet hopper 1 is

funnel-shaped in this embodiment and can also have the shape of a truncated cone. The telescopic elements 13 pushed one inside the other are surrounded on the outside by an outlet hopper 3, which has in its lower region 19 a filling opening 24 which is very slightly larger than the outlet opening 11 of the guide tube 12 of the inlet hopper 1. When the telescopic tube 2 is in the contracted position, the filling opening 24 of the outlet hopper 3 is closed by an outlet flap 4 which is pivotable about axis 22.

Accordingly, after the filling device 7 has been docked to the supply container 8, the powdered medium to be conveyed is able to fill the inlet hopper 1 in the outlet hopper 3 only as far as the outlet flap 4. The outlet hopper 3 has, outside the filling volume, a handle 5 which is connected to the outer wall of the outlet hopper 3 and which guides the telescopic tube 2 during the extension and contraction of the telescopic elements 13. In the lower region 19 of the outlet hopper 3 there is also arranged a mouthpiece 20 which has a rubber-elastic tubular casing 21 which is connectible to a tubular socket of the feed shoe.

In this embodiment of the invention, the total length  $l$  of the contracted filling device 7 is about 30 cm and the inlet opening 10 has a diameter of about 25 cm, while the diameter of the outlet opening 11 is about 9 cm. The filling opening 24 at the end of the outlet hopper 3 has a diameter of about 10 cm, which at the same time also corresponds to the diameter of the outlet flap 4. Because the filling opening 24 is very slightly larger than the outlet opening 11 it is ensured that there is no clogging of the media on transition from the outlet hopper 3 to the feed shoe. The outlet flap 4 has only one special embodiment. Alternative embodiments of



the outlet flap 4 can have, for example, two bows which are pivoted towards one another for opening, and in so doing are turned in opposite directions about the axis 22.

5 **Figure 2** shows a conveyor device 6 having a filling device 7 according to **Figure 1**, after the filling device 7 has been docked to a feed shoe 23. Components having the same functions as in **Figure 1** are indicated by the same reference numerals and are not discussed separately.

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For docking the filling device 7 to the feed shoe 23, the telescopic tube 2 has been extended with the aid of the handle 5 so that the filling device 7 has a length L of about 75 cm and can be docked to the feed shoe 23 arranged  
15 vertically below the supply container 8 by means of the mouthpiece 20 of the filling device 7. In order to seal the four telescopic elements 13 relative to one another and relative to the inlet hopper 1 and the outlet hopper 3, corresponding sealing rings 16 are provided on the upper and  
20 lower edges 17 and 18 of the telescopic elements 13. For that purpose, the guide tube 12 of the inlet hopper 1 and the telescopic elements 13 each have at least one sealing ring 16 in the region of their lower edges 18. The sealing ring 16 is for that purpose arranged in an annular recess of  
25 the respective outer surfaces 15 of guide tube 12 and telescopic elements 13.

A further sealing ring 16 is arranged at the upper edges 17 of the telescopic elements 13 and of the outlet hopper 3,  
30 the inner surfaces 14 having for that purpose an annular recess on the respective inner surface 14 to accommodate the sealing ring 16. Accordingly, the gap between the telescopic elements 13 themselves and between the telescopic elements

13 and the guide tube 12 of the inlet hopper 1 and the inner surface 14 of the outlet hopper 3 is in each case safeguarded by two sealing rings 16. As **Figure 2** shows, when the telescopic tube 2 is docked to the feed shoe 23, the outlet flap 4 is in an open position. The outlet flap 4 can be rotated into that position about the axis 22 from outside the filling device 7 with the aid of an operating element.

## List of reference numerals

	1	inlet hopper
	2	telescopic tube
5	3	outlet hopper
	4	outlet flap
	5	handle
	6	conveyor device
	7	filling device
10	8	supply container
	9	lower opening of the supply container
	10	inlet opening of the inlet hopper
	11	outlet opening
	12	guide tube
15	13	telescopic element
	14	inner surface of the telescopic elements
	15	outer surfaces
	16	sealing ring
	17	upper edges
20	18	lower edges
	19	lower region of the outlet hopper
	20	mouthpiece
	21	rubber-elastic tubular casing
	22	axis of the outlet flap
25	23	feed shoe
	24	filling opening
	25	inner contour
	26	flap
	27	axis
30		
	ℓ	length of filling device when contracted
	L	length of filling device when extended